Safety Relay with Dual Redundancy

Safe Shutdown of the Fuel Supply of Large Diesel Engines

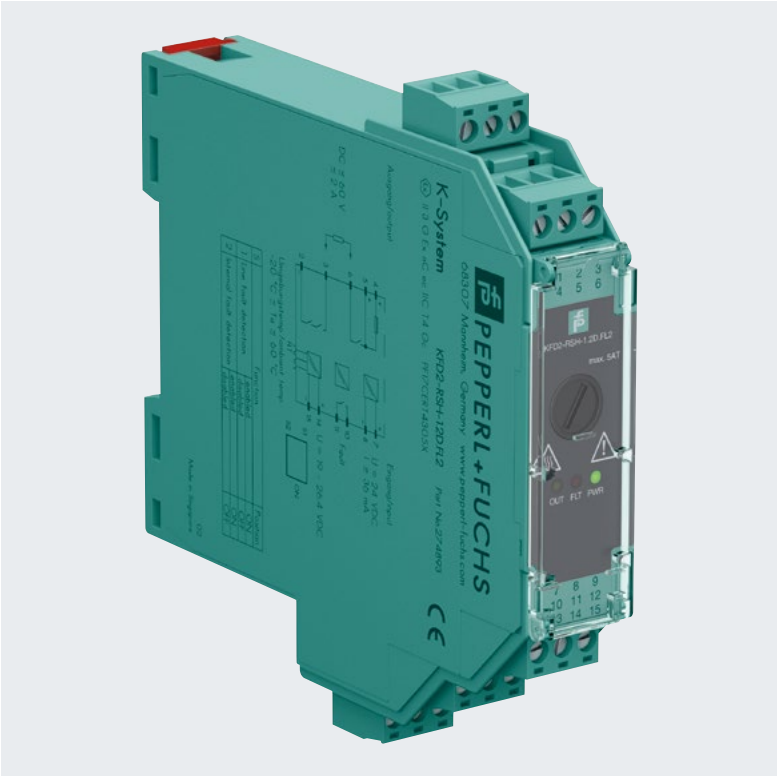
At a Glance

- Faulty fuel lines are common causes of fires in engine rooms
- Immediate shutdown of the fuel supply is crucial
- DTS safety relays with dual redundant contacts offer maximum functional safety
- 1oo3 technology, integrated diagnosis, and line fault transparency
- Test pulse filters protect against faults caused by control diagnostics

The Application

Large diesel engines with several thousand horsepower are typically used in diesel locomotives. Engines of this caliber are also often used as an emergency power unit for uninterruptible power supplies. The air-fuel mixture ignites completely within the engine and therefore poses almost no risk to the engine itself or to people working near the engine. Danger can only arise if one of the fuel lines is faulty and fuel leaks.

In this case, thermal sensors and smoke detectors are used to automatically detect fires. These devices not only trigger a visual and audible alarm, but activate automatic extinguishing systems for immediate firefighting. They also automatically shut off the fuel supply.



The Goal

Stopping the fuel supply is the first and most important action if a fire starts in an engine room that contains a diesel generator unit. To prevent the fire from being given any further fuel, it is therefore important to immediately shut down the fuel pumps before any other measures are taken. This process must be fully automatic and take place properly even under critical operating conditions.

The Solution

The key requirement for alarm systems and automatic extinguishing devices being reliably activated is fault-free signal transmission between the field circuit and the control side, which are galvanically isolated from each other.

KFD2-RSH-1.*D.* safety relays are ideal for such applications. These safety relays comply with the requirements up to SIL 3 according to IEC/EN 61508 and up to PL e according to EN/ISO 13849—a multi-stage redundancy concept for ensuring that malfunctions are virtually impossible.

The Benefits

The safety relays from Pepperl+Fuchs have three elementary relays. With this one-out-of-three architecture (1oo3), the signal is transmitted even when just one of the three contacts is functioning properly.

Due to the integrated diagnostics, achieved using time-delayed switching for elementary relays, one of the three contacts is automatically checked during each switching operation. Repeating this process annually means that the interface module will be fully tested after three years with no further testing effort required.

All safety relays are equipped with line fault transparency. Short circuits and line breaks are detected at the field level and are assigned to a specific signal circuit. This eliminates the need to connect the relay to a fault indication output, which entails additional wiring effort.

In addition, the safety relays feature an input filter, which is used to reliably filter out incoming test pulses from the control system. This allows diagnostics and proof tests to be performed without a fire alarm being triggered.